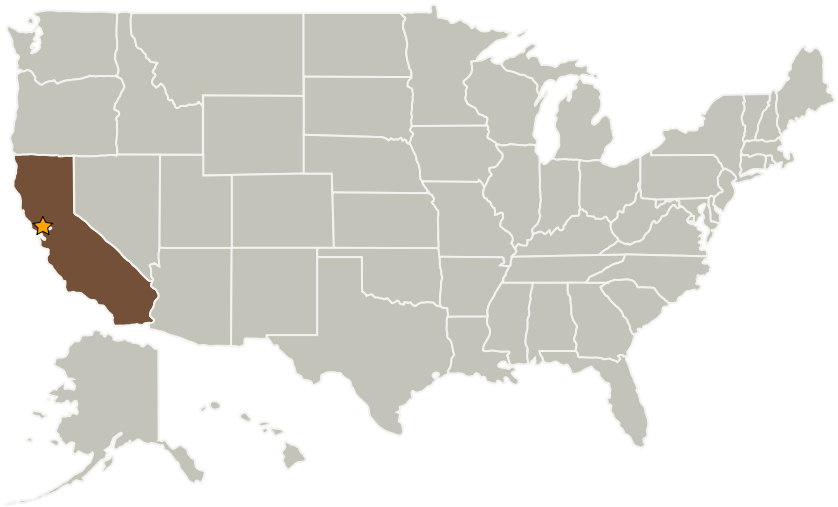
Condition Based Maintenance of Space Exploration Vehicles Using Structural Health Monitoring, Phase I

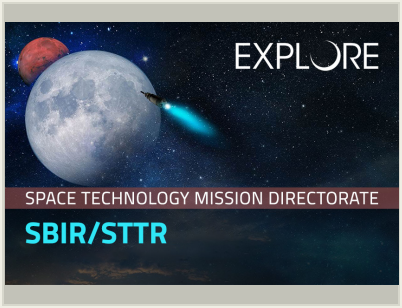
Completed Technology Project (2006 - 2006)

Project Introduction

Acellent Technologies proposes to develop an autonomous and automated diagnostic system for condition based maintenance (CBM) of safety critical structures for space exploration vehicles. The proposed system will provide real-time information on the integrity of critical structures on launch vehicles, improve their performance, and greatly increase crew safety while decreasing inspection costs. The system will encompass a gamut of functions from sensing hardware through diagnosis and prognosis all the way to presentation of the asset condition with recommended maintenance actions. Additionally the system will be developed for qualification and reliable use with space vehicles from the time of manufacture through launch. The biggest payoff of IVHM is development of system determining health prior to vehicle operation. Technologies will be developed to reliably instrument and monitor damage in critical structures such as rocket motors. The system development will be based on Acellent's SMART Layer technology that utilizes a network of sensors and actuators to query and monitor the integrity of a structure. In Phase I, a prototype CBM system for rocket motors will be developed and preliminary qualification tests conducted in collaboration with ATK-Thiokol. Phase II will focus on complete system development and interface with the rocket motor IVHM system.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Acellent Technologies, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Sunnyvale, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.3 Reliability and Sustainment